**Grade: XII Maxima and minima**

**Looking at the graphs of f, f’, f” simultaneously, the ideas of maxima and minima can be understood better.**

**Fig(i) is the graph of . Here A is a point of local maximum and B is a point of local minimum. The function increasing from 0 reaches A and then begins to decrease. Hence maximum occurs at x=4 similarly minimum occurs at x=2.**

**Fig(ii) we have the graph of  which is obtained by differentiating f(x). points A’ and B’ here correspond to points A and B in fig(i) respectively. The curve of f’(x) cuts the x axis at x = 2 and x = 4. Hence f’(2)=0 and f’(4) = 0. Note that x=2 and x=4 give extreme values of f(x) and hence at these points f’(x) becomes zero.**

**Fig(iii) is the graph of f”(x)=2x-6, obtained by differentaiating f’(x). the points A” and B” here correspond to A, B in fig(i) and A’ and B’ in fig(ii). F(x) having a maximum point A at x =2 , f”(x) gets a negative value -2 at x =2. Similarly f(x) having a minimum point B at x =4, f”(x) reaches a positive value-2 at x =4.**

**Thus at a point of local maximum f’ is zero and f’’ is negative, at a point of local minimum , f’ is zero and f’’ is positive.**